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AN ESSAY.

ON

YELLOW FEVER.

COMPRISING THE HISTORY OF THAT DISEASE,

AS IT APPEARED

IN THE ISLAND OF ANTIGUA

IN THE YEARS 1835, 1839, & 1842.

WITH AN

APPENDIX CONTINUING THE HISTORY TO 1853.

BY THOMAS NICHOLSON, M. D.

*(Read before the Epidemiological Society of London,
July 4, 1853, and published in the Association Medical
Journal for Sept 1853.)*

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ANTIGUA :

REPRINTED BY W. MERCER.

1856.

AN ESSAY.

THE subject of the following essay is that peculiar form of fever, which, under the different names of Yellow Fever, Vomito Negro, Vomito Prieto, and Bulam Fever, has been known to the English and Spanish colonists on both sides of the Atlantic for nearly a century, occurring at distant and uncertain intervals, and producing great mortality, especially amongst Europeans who have resided but a short time in these parts. It has been described by nosologists under the terms of Typhus Icterodes, *Cullen* ; Synochus Icterodes, *Young* ; Epanetus Malignus Flavus, *Good* ; and more recently by Dr Copland, from its pathological characters, Hæmagastric Pestilence. The term *Hæmalytic Epidemic* of the Atlantic shores would, in my opinion, express more accurately the peculiar features of the disease ; but I am unwilling to make any additions to its nomenclature, which, after all, is of little importance.

I had been thirteen years in Antigua, before I had an opportunity of witnessing a single case of this disease, although severe and fatal cases of Bilious Remittent were met with in malarious localities every year, and in some seasons prevailed as an epidemic over the whole Island ; as, for instance, in the year 1823, a short account of which, by my friend Dr. Musgrave, will be found in the twenty eighth volume of the *Edinburgh Medical and Surgical Journal* for 1827. Yet, although the mortality from this epidemic was very great, in no instance did black vomit occur ; and, from the information I could collect on the subject, I have every reason to believe that *vomito prieto* was not known amongst civilians in that colony, from 1816 till 1835. I exclude, of course, the cases of the *Pyramus*, and two other men-of-war, which arrived at English Harbour with yellow fever in 1821 and 1822.

Being taught in my early years, by the writings of Bancroft, Fergusson, and others, and by the oral instructions of the medical gentlemen under whom I served in the West Indies, to regard yellow fever as a more severe grade only of the endemic fever, I was often puzzled to account for the absence of this peculiar symptom in all the cases I had seen; and I was sometimes inclined to hazard an opinion that, after all, Chisholm might be right. Subsequent experience has convinced me that yellow fever differs as much from bilious remittent, as the epidemic or Asiatic cholera differs from sporadic or English cholera; but I never met with any circumstance that could prove its propagation by contagion. The following history will show that it broke out in St. John's in 1835, at a time when our harbour was almost destitute of shipping, and when, consequently, we had no intercourse with the neighbouring islands; and, although convalescents were frequently carried into the country for change of air, the disease was not propagated in the rural districts.

On the 12th August, 1835, the island of Antigua was visited by a severe hurricane, which did great damage to the buildings in town and country, but more so to the vessels in the harbour of St. John's, most of which were driven on shore and destroyed, or so much disabled as to be unfit for sea. A person inexperienced in these tropical tornadoes, can scarcely form an adequate idea of the fury with which the wind raged for a few hours. The Barometer fell in the course of one hour and twenty minutes 1.5 inch, a rapidity of descent which, as far as I can learn, has not been equalled in any former hurricane on record. The centre of this whirlwind moved at a steady rate in a westerly direction, being felt some hours later at each island in that course; and, strange to say, it was scarcely felt at all forty miles to the south of Antigua. Before the occurrence of the hurricane, the inhabitants were tolerably healthy, at least they were free from any acute or febrile diseases; but the weather was dry and sultry, and dyspeptic complaints were more than usually prevalent. The excitement, however, occasioned by the hurricane, and the vigorous exertions required to repair its effects, dispelled these anomalous complaints, and for some weeks subsequent to the gale, the number on the sick list was small.

The state of the weather was not similarly ameliorated by the atmospheric commotion. The heat was greater ; the wind variable, and more westerly than usual ; and there were frequent showers of rain. The sea, which rose in the gale above its usual level, aided by the wind, had deposited a great quantity of marine organic matters and vegetable rubbish about the wharves and precincts of the town bounded by the harbour ; and it was remarked by the inhabitants in that quarter, that the smell arising from the sea, particularly at night, was peculiarly offensive.

On the 20th September. I was called to a case of fever in a young Irishman, who resided in a house on one of the wharves, which had suffered greatly in the gale, and was then undergoing repair. It proved rather an obstinate case ; the headache, gastric irritability, and rachialgia, being very severe ; but it terminated favourably. When, each successive day, one or two other cases were added to my list, I began to suspect that we were about to have a visitation of some epidemic ; and it is recorded in my note-book at that time as *epidemic gastric fever*. It is worthy of remark, that it broke out in the same locality, and much in the same way, as the “Dandy Fever”, that peculiar arthritic exanthem, which I have described in vol. xxxi of the *Edinburgh Medical and Surgical Journal* for 1829, p. 115.

I was attacked myself on the 7th October ; and during my confinement, which was only three days, the more malignant characters of the disease were developed. But it was not till the 10th October that we had a case of black vomit, when the true nature of the epidemic was discovered. It may be necessary to mention, however, that none of the medical gentlemen engaged in practice in St. John’s at that time, had ever seen a case of yellow fever, otherwise the discovery might have been made earlier.

The epidemic continued to increase till the first week of November ; after which it gradually declined, and by the end of December had nearly disappeared. The last death occurred on the 24th of that month, in the wife of a Moravian missionary, who arrived in the island from England on the 9th, and was attacked on the 15th. During that period, I had attended two hundred and twenty cases ; of whom seventy-

five were Europeans, sixty-five white Creoles, and eighty coloured persons. Of the Europeans, twelve died ; of whom ten had not been in the island twelve months. None of the Creoles or native whites died ; but two of the mixed race sunk under peculiar circumstances.

In June 1839, yellow fever again made its appearance, attacking only those young men who had come to the island during the interval. This epidemic was of a more open or inflammatory type than the former, and copious venesection was practised with much success.

In September 1842, another invasion of the disease took place, and continued till the middle of November, during which time I attended forty-three cases, viz : twenty-two Europeans, twenty white Creoles, and one of the mixed race. The Europeans had only been a few years in the colony, and of these eight died; the Creoles were chiefly children, of whom three died.

On all these occasions, it is remarkable that the epidemic was confined to the town of St. John's ; and although our practice extends over twenty-eight estates, on each of which several white persons resided, who were unprotected by a former attack, none of these took the disease.

SYMPTOMS.

In private practice, the physician has few opportunities of witnessing the premonitory symptoms of fever, except in his own person ; and therefore I will only describe what I myself experienced. I got up in the morning with an unusual feeling of lassitude, and with some uneasiness in the head, and pain in the back and limbs. I had no sense of chilliness, nor was the temperature of the surface increased ; but I had much thirst, and the swallowing of liquids was immediately followed by nausea and copious perspiration. The pulse was weak and variable, and much accelerated by the slightest exertion. Notwithstanding these symptoms, I continued to discharge my professional duties till 10 P. M., when the pains in the head and back became almost intolerable, the vomiting incessant, and the febrile excitement fully developed. The paroxysm continued for thirty-six hours, when it left me in a state of extreme exhaustion, with a furred tongue, which last-

ed for several days, and a yellow hue in the skin and conjunctiva.

Such was the mild form in which the epidemic manifested itself in natives and persons who had been long resident in the West Indies ; but in others it assumed a highly malignant character, producing a rapid dissolution of the blood, which exuded into the mucous canals, and sometimes even through the pores of the skin ; and it frequently terminated in death by asthenia or coma, on the third, fifth, or seventh day.

Three varieties of this malignant type were observable. The first I shall term the *ardent* ; the second, the *adynamic* ; the third, the *congestive* or *apyretic*.

I. The ARDENT form was ushered in with the usual symptoms of a febrile attack—slight rigors, or only a coldness of the extremities, headache with suffusion of the eyes, general lassitude, and pain in the back. In a few hours, these symptoms were followed by a hot burning skin, great throbbing of the carotid and temporal arteries, intense headache and rachialgia, pulse from 90 to 120, full and strong, incessant thirst, and vomiting of fluid which often exceeded in quantity what was swallowed. The bowels were obstinately constipated, the urine high coloured, and sometimes entirely suppressed. The discharges from the bowels produced by medicine, generally resembled ditch water, being free from all appearance of bile. The blood drawn at the first visit presented no unusual character. About the second day, the patient complained much of flatulency in the stomach, occasioning frequent efforts to expel it, which Dr. Dewees of Philadelphia has very graphically described as a *vomiting of wind*. There was also a sense of stricture about the cardiac orifice. On the third day, the skin had assumed a lemon colour, which was first perceptible in the conjunctiva and upper parts of the neck ; the heat had subsided, but the pulse had increased in frequency ; hiccough was urgent. The matters vomited were mixed with dark flakes, sometimes resembling snuff, sometimes the dregs of port wine. Soon after this, two or three pints of a black fluid, like soot and water, were ejected with great force, and death closed the scene. In some cases, the vomiting would cease suddenly, either spontaneously or on the exhibition of

an opiate, and violent delirium or coma would supervene.

CASE 1. D. G. aged 21, engineer, lately arrived from England, Oct. 23, 1835, awoke with a sense of fatigue and pain in his back, which he ascribed to a long walk he had taken the evening before. At noon he was found in a high state of fever, with intense pain over the orbits, red watery eyes, pulse 100, full and strong. He was bled to thirty ounces, and pills of calomel, compound extract of colocynth, and jalap, were ordered. The bleeding relieved the headache, reduced the pulse to 90, and occasioned a copious diaphoresis. At 4 P. M., headache and febrile heat had returned; and vomiting was urgent. The abstraction of eight ounces of blood was again followed by relief of all the symptoms. The pills were repeated every second hour, with effervescing draughts of the tartrate of soda. 8 P. M. The fever was less violent; the bowels had not been moved. The hair was cut; and cold affusion applied to the head as often as the heat returned. The medicines were continued.

24th. Headache and vomiting were still urgent; the medicine had acted but slightly. Five grains of calomel were given every two hours, with solution of sulphate of magnesia in the intervals. A sinapism was applied to the epigastrium. The cold douche was continued.

25th. The medicines had acted slightly; and heat had abated. There was frequent emission of gas; a yellow tinge of the skin; scanty urine. A blister was applied to the epigastrium; the calomel was continued, and two grains of camphor, every two hours.

26th. He was much easier; had had dark tar-like stools.

27th. He was reported to have passed a quiet night; but I found him at 6 A. M. sinking; the skin cold and pulse scarcely perceptible. Wine and other stimulants were prescribed; but he died at 10 A. M., immediately after ejecting a wash-hand-basinful of the black vomit.

POST MORTEM EXAMINATION at 3 P. M. The external surface was of a yellow colour, spotted with purple patches.

Abdomen. The viscera appeared healthy externally. Liver of a natural size; yellow colour. The gall-bladder contained a small quantity of dark green viscid bile. The stomach contained a pint of black fluid: internal surface highly con-

gested, from cardiac orifice to $1\frac{1}{2}$ inch from pylorus. Small intestines full of black inky fluid, which was warm, and in a state of fermentation. Peyer's glands were very conspicuous, colon stained of a dark livid colour, interspersed with red patches. Kidneys healthy. There was half a pint of urine in the bladder.

CASE II. Mr S. A. aged 25. I was called at 11 P. M. on the 8th October, 1842, to visit this young man, a native of Scotland, who had been but a short time in the island. I was informed that he had been complaining of great lassitude all day, with pain in the back and limbs. I found him labouring under intense rachialgia and incessant jactitation, with much headache and coldness of the lower extremities. His feet were immersed in hot water, and in that position he was bled to the extent of thirty ounces with great relief of all the symptoms. His pulse which before the bleeding was 120 and very small, became fuller and less frequent. His skin became moist, and the temperature more equable. He was ordered to take large doses of calomel, colocynth, and jalap, every two hours till his bowels were emptied. On the morning of the 9th, Dr. Musgrave found him complaining of a return of headache, with an increase of heat, and he thought it advisable to abstract about eight ounces more blood from him. The purgative pills were continued, with the addition of a mixture of the compound powder of jalap, but his bowels were slow in responding. In the course of Monday, the 10th, his stomach became very irritable, and he brought up much larger quantities of fluid than appeared to be ingested. The prescription was a blister to the stomach, five grains of calomel every two hours, with effervescing draughts. On the morning of the 11th, he was found much cooler, and quinine was tried : but the irritability of the stomach prevented a continuance of it. Black vomit and hiccough succeeded ; and he died at six o'clock in the evening.

CASE III. Mr. F. P., aged 21, an Englishman, about two years in the island, was attacked 1st November, 1842, with giddiness, and pain in the head and back. When visited, the febrile excitement was fully developed. He was bled in the erect position till approaching syncope, when profuse perspiration broke out ; the heat was subdued and all the symp-

toms relieved. The bowels were freely opened with calomel, colocynth, and jalap. He took ten grains of nitre, with a few drops of spirit. æth. nitros, in a glass of water every two hours. On the 3rd, he was in a state of complete apyrexia. Two grains of sulphate of quinine were given every second hour, during the day, and on the 6th he was struck off my list as perfectly cured.

CASE IV. Mrs. P. wife of the preceding, aged 20, a native of the island, but who had been some years in England for education, was attacked November 7th with all the symptoms of the prevailing epidemic, being five months advanced in pregnancy. She was bled to the extent of twenty-four ounces, and treated in every respect like her husband ; and on the 12th she was convalescent.

CASE V. Mr. W. B., Englishman, aged 25, about three months in the island, was attacked 7th November 1842, with the usual symptoms of the ardent form of yellow fever then prevailing. He was bled to the extent of forty ounces ; was purged with calomel, colocynth, and jalap, and afterwards took effervescing draughts of tartrate of soda with nitre. On the 10th he was convalescent. He took quinine for three days, after which I took my leave.

II. The ADYNAMIC form was usually met with in females and persons of a lax fibre and deficient animal vigour. It was ushered in by slight rigors, giddiness, and pain in the back, frequent sighing, and sense of oppression at the præcordia. The reaction which followed was slight, unattended with pungent heat of the skin, or strong arterial action ; the pulse was small and compressible. This stage did not last more than forty-eight hours, and was followed by the stage of collapse, great prostration of strength, cold clammy sweats, feeble pulse, hiccup, vomiting of a dark grumous fluid, yellow colour of the conjunctiva, and a urid hue of the face. Hæmorrhage from the nose, mouth, anus, and vagina, followed, under which the patient sunk in a fit of syncope or asthenia. In others the sensorium was early affected, there was a total suppression of all the secretions ; the patient lay tossing about in a state of wild delirium, totally disregarding exposure of her person. Hæmorrhage took place from all the passages ; the sheets were stained with blood ; her

hands were bloody, and her eyes yellow the arms, legs and back spotted with vibices, the fairest of creation became an object of pity and abhorrence : in such cases death was hailed with joy by all her attendants.

CASE VI. Mrs. W. aged 31, native of Scotland, about three years in the island, was attacked at 5 A. M., on the 10th October, 1842. with shivering, and great pain in the back, which were soon followed by symptoms of fever of a mild character, the pulse was quick and feeble, and the skin warm, but rather moist. The fever continued during that and the following day without any urgent symptom, except a distressing pain in the back. On the 12th, she was found free from fever, and a solution of sulphate of quinine was prescribed. But at 3 P. M., she was suddenly seized with vomiting, and brought up a pint of *black* fluid ; after which her pulse began to fail, and symptoms of collapse occurred. At 5 P. M., she had an epileptic fit ; diffusible stimulants were administered liberally ; but she remained for several days in a state of extreme exhaustion. On the 13th, hiccup was added to the other bad symptoms. On the 14th, the abdomen was tympanitic, when twenty drops of oleum terebinth were given every two hours with good effect. Next day the bowels became relaxed. The discharges consisted of bloody serum : these were restrained by tincture of opium and carbonate of ammonia, and she gradually recovered.

CASE VII. Mrs. W., aged 28, a native of England, from which she had arrived only a few months. This lady's husband was a physician, holding an official situation in the colony, but was not engaged in practice. His mother-in-law died of fever on the 15th October, 1842; never having been considered by him in danger till fatal coma occurred. This unexpected event occasioned much grief to Mrs. W., and she was preparing to accept the invitation of a friend to spend some time in the country, when I was sent for, on the 25th October. I found her seated on a chair dressed in mourning, and the carriage at the door ready for the journey. She complained of giddiness, pains in the back, and a total prostration of strength. Her husband was urging her to proceed, protesting that she was suffering only from grief and want of sleep. Her pulse was quick ; and there was increased heat about the

head and trunk ; although her skin was generally moist. I sent her to bed, and called a consultation of her medical friends in two hours ; when I hoped reaction would have taken place, and as she was of a plethoric habit, though phlegmatic temperament, the propriety of bloodletting might be a question of intricacy. At our visit, fever was more fully developed ; but the state of the pulse did not admit of venesection. Purgatives, into which calomel entered largely, were prescribed, to be repeated at short intervals. Next day there was no distinct change. The following day, the febrile symptoms were increased, with much cerebral excitement and constant jactitation. The head was shaven ; and the calomel with camphor, given every two hours. But the symptoms became gradually worse. The delirium was violent, and she was with difficulty retained in the bed. The secretion of urine was suppressed ; hæmorrhage took place from the nose, mouth, and vagina ; the skin was yellow, and the arms, legs, and depending parts were marked with livid spots. She died on the fifth day. Her husband was attacked with the disease under the *congestive* form on the 27th, and died on the seventh day.

III. The **CONGESTIVE** form is characterised by the total absence of febrile heat. The patient has a stupid, drunken appearance, will scarcely admit that he is ill, or complains only of slight pain in the back and limbs. He staggers in his gait, or lies in a soporose state. Deafness ensues, and afterwards low muttering delirium. The pulse is at first slow and intermitting ; it becomes quicker in the progress of the disease, but seldom exceeds 100. The stools are unnatural, without any admixture of bile ; the urine is scanty, and is ultimately suppressed. The skin is of a yellow mottled hue. Hiccup occurs early, with black vomiting, and hæmorrhage from the mouth and nose, and the case usually terminates by convulsions or coma.

CASE VIII. Mr. F., a native of the United States, aged 38, about a week after his arrival in Antigua, in November 1835, was attacked with slight headache, and pain in the limbs, which he said he would scarcely have noticed but for the prevalence of yellow fever in St. John's: His pulse was slow and intermitting. His medical attendant treated him with

active doses of calomel ; but the bowels were scarcely moved, and the discharges were destitute of bile. On the third day he became tinged with a yellow suffusion. On the fourth I saw him ; his pulse was then 96 ; he had hiccup ; hæmorrhage from the gums ; and vomiting of a brownish fluid with dark coloured flocculi. The urinary secretion was suppressed. Being a stranger and a man of family, the merchant to whom he was consigned, requested that we would make known to him our opinion, if we thought him in danger. This was done in as considerate terms as possible by his medical attendant ; when he replied very angrily, that he begged leave to differ from us, he was not ill, and we had quite mistaken his complaint. Next morning he was found incoherent sitting up in bed and with a fixed melancholy gaze and corrugated brow : blood was issuing from the pores of the right cheek. He took no notice of us as we entered his room, but continued repeating the letters of the alphabet slowly. He died in the evening after several convulsions.

DISSECTION. On opening the abdomen, the stomach was observed much distended, and presenting on its external aspect several dark spots like incipient gangrene ; but on laying it open, this was found to be occasioned by the abrasion of the mucous coat in several places, and the presence of a black inky fluid, like soot and water. The mucous membrane of the upper half of the duodenum was also abraded. The rest of the intestines were sound. The liver was pale ; the gall bladder was distended with dark green bile. The lining membrane of the heart was highly injected and studded with patches of extravasated blood in several places. The sigmoid valves exhibited the same appearance.

ANATOMICAL CHARACTERS.

The yellow colour of the surface of the body was always more distinctly visible after death ; and on the depending parts it was mixed with purple patches. All the appearances indicated a defective crisis of the blood : it remained fluid after death. The capillaries of the serous membrane were in a state of hyperæmia, but there was seldom any exudation of *liquor sanguinis* perceptible. The mucous membrane of the upper half of the alimentary canal was generally softened,

and the epithelium detached from the stomach and duodenum. The muciparous glands were found enlarged only in one case. The stomach contained always more or less blood, which was changed into a black colour, and frequently mixed with gas. The liver was usually of a pale bloodless colour, and the spleen presented no unusual appearance. The gall bladder was sometimes tinged with black bile, in other cases it was nearly empty. The thoracic viscera exhibited only such appearances of congestion as were referrible to the fluid state of the blood, and the mode of death. In one case, the blood in the right ventricle had a frothy appearance, having been evidently mixed with gas during life.

DIAGNOSIS.

The only diseases with which yellow fever can be confounded are bilious remittent, and the malignant forms of intermittent fever, and as many medical men, for whose opinion I entertain the highest respect, consider all these fevers as the offspring of the same terrestrial miasmata, modified only by the constitution of the individual, and other unknown agents. it is necessary that I should relate more fully the circumstances which have induced me to form a different opinion. My experience is derived entirely from a residence of twenty-five years in Antigua, where intermittent and remittent fevers are endemic, and met with every year, chiefly from September to March, and where yellow fever has only occurred three times during that period. The endemic fevers prevail chiefly in the country districts, and the inhabitants of St. John's are seldom attacked with them. Whereas, the epidemic yellow fever was confined to the city and to the garrison at the Ridge, and at English harbour. It is difficult to account for the comparative exemption from remittent fever which is enjoyed by the European youths who are employed in the mercantile profession in town, whilst those who superintend agricultural operations in the country, never escape.

Antigua is of a rough circular figure, being 20 miles long and 54 in circumference, containing 108 square miles, equivalent to 69,277 acres ; two-thirds of which are under cultivation. There are few springs in the island, and no streams that deserve the name of rivers ; but it is much indented with

creeks and bays, whose oozy waters maintain the growth of impenetrable thickets of the different species of mangrove, and are the fertile sources of malaria.

In a geological point of view, the island comprises three distinct formations of the tertiary class, of which the most superficial beds occupy the northern and eastern divisions. These consist of a calcareous marl, and coarse sandstone, interspersed with masses of a tolerably compact shell limestone. On the surface are found a great variety of marine exuvæ, analogous to those which at present inhabit the surrounding seas, as *astrea*, *meandrinæ*, *tubipora*, etc. The surface of this district is exceedingly broken and undulated, consisting of a series of round-backed hills of no great elevation, covered with a light arid soil. The sides of the hills and intervening valleys are highly cultivated, and produce a rapid growth when duly favoured with rain.

The mountainous district, forming the southern and western divisions, is composed of rocks of the newest flötz trap formations, as *wacke*, *porphyry*, *trap breccia*, *ampyg laloid*, and some spherical masses of basaltic green-stone. Some of these mountains rise with conical summits to the height of 800 to 1,000 feet; others, of the same elevation, are more rounded and less precipitous, affording a good soil for the sugar-cane even on the tops. They are intersected by beautifully romantic valleys; and the abrupt sides of the mountains are clothed with the verdant foliage of a great variety of herbs, and trees, and twining shrubs.

The intermediate district is occupied by a series of argillaceous strata of varied characters, which dip at a considerable angle to the north and north-east, and extend across the island from Willoughby Bay on the south-east to St. John's in the north west. The northern limit of this district is formed by a zone of low land, which at no very distant period, appears to have been submerged, and even now, after heavy rains, is readily converted into a marsh. It rises with a gentle ~~incli-~~ *ac/* vity towards the south and south-west, where it presents a precipitous escarpment, and is divided from the trap formation by a ravine, in which are pools of stagnant water, and a sluggish stream which runs towards the west, through a beautifully luxuriant plain.

Although this district, and the mangrove creeks with which the island is indented, present the only unequivocal sources of paludal emanations; yet all parts of the island are at certain seasons affected by malaria—the dry, calcareous soil of the north, equally with the humid valleys of the south. How is this to be explained? Two things are always present when fever prevails in these districts—a hot sun during the day, and circumstances favourable to the radiation of heat from the earth, and the deposition of dew at night.

The febrile poison, whatever it may be, appears to be deposited with the dew, even at a distance from its source; and all who are subjected to its influence, as it rises again at the approach of the sun, are as much affected as if they had inhaled it at the fountain-head. This is the only way in which I can explain the greater prevalence of fever in country districts than in St. John's; it being well known that more dew is deposited in the open country than in cities, where houses conceal a portion of the sky. A soil covered with vegetation is also more favourable to the production of dew, than the trodden streets of a town. At these seasons, the mean dew point is about 70° ; but, in the cloudless moonlight nights, the thermometer falls sometimes to 66° , producing an unpleasant sensation of cold, of which the inhabitants of northern latitudes, who enjoy a temperature some degrees lower than this, can scarcely form an idea.* The injurious effects of dew have been long known to the vulgar; and I think it has been unjustly overlooked by the late Dr. William Fergusson, in his interesting paper on "Marsh Poison."

* Dr. Chisholm in his manual of Tropical Diseases mentions this peculiarity of temperature in Antigua, but in my opinion he has overlooked the true cause. He says, "Antigua, being altogether argillaceous, is distinguished by a peculiarity in the temperature of its atmosphere; it is a degree of cold not observed in any of the other islands, but which has, on the human body, all the influence of marsh exhalation, although no swamps are in the neighbourhood of St. John's where this singular cold is chiefly felt, after rain has continued to fall for a few hours.—On these occasions Fahrenheit's thermometer falls to 62° "—page 2. Now I have never observed the thermometer below 64° —and it was always in the driest seasons and in cloudless moonlight nights, and generally in the month of February *not after rain*, when this unusually low temperature occurred. Antigua is one of the driest of the West India islands, and to this circumstance and the low dew point I attribute the descent of the thermometer where terrestrial radiation is great. Professor Fleming on the "Temperature of the Seasons" observes;—"When the air is very dry, or where the dew-point is

So much for the extrinsic cause of endemic fevers. Let us next inquire whether these fevers may be so far modified by constitutional peculiarities in the European, as to assume the *continued* or *malignant* form of yellow fever. Since the year 1837, a considerable number of English labourers have been imported into Antigua, which has afforded me an opportunity of seeing this question put to the test of experiment; and, although they have all suffered more or less from the *fièvre au pays*, not one case of black vomit has come to my knowledge. In May 1843, twenty-six English tradesmen were imported, by a wealthy mercantile firm, for the purpose of rebuilding those works which were destroyed by the earthquake on the 8th of February of that year. They were lodged in the country, in a house sufficiently roomy, and in every respect commodious, but in a locality much exposed to *malaria*. Their employer, considering the heat of the sun the only thing likely to be prejudicial to the health of these unacclimated strangers, allowed them to retire to their house for three hours at noon; but they entered on their work before sunrise in the morning. They were all attacked in a short time with remittent fever, of the most aggravated type, attended with a deep yellow colour of the surface, delirium, etc; yet they all recovered without hæmorrhage from the mucous passages, black vomit, or any symptoms indicative of that dyscrasia of the blood peculiar to yellow fever.*

Again, in 1845, about thirty mechanics were imported, to rebuild one cathedral, which was destroyed by the same visitation. They were located in St. John's, where they remained upwards of two years; and not one of them was attacked with fever — another proof of the greater prevalence of the en-

very low the descent of the evening branch of the curve will be prolonged, in the absence of the counteracting curve which has been referred to — (viz. the caloric given out when vapour is converted into dew;) and in consequence the cold of the night may be great. But when the air is humid or in ordinary language nearly saturated with moisture, and the dew-point consequently high, then the sinking of the evening temperature is prevented from exceeding in any considerable degree that point at which the existing vapour must be converted into water." — page 22.

* One old man died afterwards in the Colonial Infirmary, of the sequelæ of the fever; and I have heard that some of the others died of dropsical symptoms on the passage to England, no doubt from organic diseases of the abdominal viscera produced by the fever.

demic in the country than in town, and also that an unseasoned constitution is not sufficient to convert remittent into the continued yellow fever.

I am desirous of confining my remarks to what came under my own observation, otherwise I might add, that yellow fever occurs where marsh fevers are not known, as on board of ships at sea, in the garrison at Barbadoes, at Vera Cruz, etc.

Are there no symptoms by which yellow fever may be distinguished from other form of tropical fever? At the commencement of this disease, there are no symptoms by which it can be distinguished from an attack of the endemic, or even any other ephemeral fever arising from atmospheric changes. The suffusion of the eyes, pain in the head and back, closely resemble the precursory symptoms of influenza. It is only in the progress of the disease, when the torpid state of the secretory glands, the chlorotic hue of the skin, and hæmorrhage from the mucous surfaces, reveal the nature of the epidemic. Whether the morbid state of the blood, which forms the *pathognostic* symptom of this fever, is the immediate effect of its contamination with a poisonous principle from *without*, or merely the consequence of defective elimination of effete matter generated *within* the body, is a question that has not yet been determined. Probably this change in the vital fluid is attributable to both causes.

It is very evident that the first link in the concatenation of morbid phenomena is congestion of the capillaries of the brain, spinal chord, and abdominal viscera; and the great benefit derived from blood-letting at the commencement of the attack, so as to remove this state of congestion, would seem to prove that it is the chief proximate cause of the disease. On the other hand, the great susceptibility of Europeans, who have never had the disease, and the immunity of those who have once had it, and of those whose blood has been modified by a long residence in a warm climate, look like the operations of a morbid poison on certain substances, which may exist in the blood of one individual, and not in another.

The yellow colour which attends bilious remittent is generally, if not always, produced by excessive secretion of bile, and the reabsorption of some of it into the blood: notwithstanding, a large quantity is duly excreted, as shown by the

colour of the stools, which varies from a deep yellow to a dark green. Some doubts have been entertained recently whether excretions from the bowels of a green colour are due to bile; but of this no practitioner in the West Indies can possibly have any doubt.

Louis, in his observations on the yellow fever of Gibraltar has laid much stress on a peculiar colour of the liver, as a diagnostic character. Nothing very remarkable to the naked eye was observed in Antigua fever, except in some cases its anæmic colour; and we had no means of making a microscopic examination.

Not the least remarkable feature in the history of yellow fever is the fact generally admitted, that it attacks an individual only once in his lifetime. This was in great measure corroborated by the epidemics that fell under my notice; not one of those persons who suffered in the first epidemic was attacked in the subsequent visitations.

TREATMENT.

When the epidemic began in 1835, it was treated on the general principle pursued in the treatment of fevers within the tropics. At the first visit, if the symptoms were sufficiently urgent, and particularly if the patient was a European, in whom the tone of the vascular system was unimpaired, blood was drawn in sufficient quantity to produce a decided impression on the system, as indicated by relief of the headache and pain in the back, reduction of the pulse, and a general diaphoresis; an active purgative of calomel, compound extract of colocynth, and jalap, was administered, and repeated every two or three hours, till a satisfactory discharge from the bowels was produced; the action of the kidneys was stimulated by small doses of nitre, frequently repeated; and the head and chest were assiduously sponged with cold water. When these measures failed to relieve the febrile symptoms, and to rouse the liver to increased secretion, five grains of calomel were given every two hours. Vomiting was arrested by the application of rubefacient of capsicum or mustard, or sometimes of a blister to the epigastrium, aided with saline effluvia, or a draught of magnesia, tincture of opium, and mint water.

The following case, however, created a strong prejudice against blood-letting, and the mercurial treatment was chiefly confined to after that. Calomel was given in some cases to the extent of 250 grs., without any sensible effect on the system ; and it could generally be detected at the bottom of the vessel containing the watery stools, in the form of black oxide.

CASE IX. Mrs B. a native of England, aged 35, was attacked, on October 4th, 1835, with symptoms of the prevailing fever. Her husband, in his youth, had been some time in an apothecary's shop, and still retained a love for the profession, which he displayed occasionally by the practice of minor surgical operations, such as bleeding and extraction of teeth, for the benefit of his friends. On the evening of the 4th, he made various ineffectual attempts to draw blood from Mrs B ; and on the 5th I was sent for. I found her labouring under symptoms of a mild attack of the fever, and venesection might have been considered unnecessary ; but to please her husband, and at the same time, perhaps, not a little influenced by a desire of convincing him that he was not an expert surgeon, I abstracted about sixteen ounces of blood at a full stream. This depletion appeared to be well borne, and the headache and other febrile symptoms were much relieved. She had already taken purgative medicine, and a mild febrifuge was all that was considered necessary. Her husband was attacked the following day, and I myself on the 7th, having left Mrs. B. apparently convalescent. On the morning of the 9th, she was so well, that she got up, and went into the adjoining bedroom where Mr. B. was lying. She sat for some time on his bed, endeavouring to comfort him with religious conversation, and expressing her gratitude that she had so far recovered as to be able to attend to him. On returning to her chamber, she discovered that she had a discharge which she took for the catamenia. Soon afterwards, she was attacked with syncope. Messengers were sent in every direction for medical men, and three were very soon at her bedside ; but the vital spark had fled. Two of these medical men were strongly opposed to the use of the lancet in fever, and it was very currently reported that Mrs. B. had fallen a victim to this rash practice ; and the effect on the public mind was such

that to propose such a measure afterwards was met with horror both by the patient and his friends.

The lancet was not used in any of the cases that died subsequently, except that of D. G., already described, page 8.

In the epidemic of 1839, when the *ardent* form prevailed, and also in 1842, blood-letting was had recourse to at the commencement of the attack, with great benefit, and, in some cases, to a very large extent.

Our assistant, Dr. C., lost about 60 ounces of blood, and my son not much less; and, in a few days, they were both convalescent. However, it is only within the first twelve hours from the commencement of the hot stage, that this bold treatment is admissible. If the congestion in the capillary system is not removed by the early and decided use of the lancet, the blood soon becomes so disorganised, and the tone of the extreme vessels so destroyed, that the loss of even a few ounces cannot be borne with safety.

CASE X. Mr. C., aged 23, a native of England, had been about six weeks in the island, when he was attacked with symptoms of yellow fever, on the 8th October, 1842. He had been confined to his bed, and under treatment for a sprained ankle, for some days previously, so that the first twelve hours of the fever were overlooked. On the morning of the 9th he was bled; but a tendency to syncope occurred before eight ounces of blood had flowed. His pulse was never above 90. On the 10th, he had black vomit, and the stage of collapse commenced. His skin was yellow and mottled with livid spots. Wine and porter were given liberally, and for a time he appeared to be recovering his strength; but on the evening of the 11th, the wound in his arm burst out bleeding, which was not observed till his pulse was nearly extinguished. He died at midnight.

In the *asthenic* form, blood-letting was of course never thought of; and in the *congestive*, I never had the courage to make the trial. In the latter moments, diffusible stimulants, rubefacients, and blisters, were the remedies used; but they were generally as ineffectual as if they had been applied to a dead body.

During convalescence, quinine was always administered,

to the extent of six or eight grains of the disulphate daily ; and the dietetic regimen required the utmost attention.

APPENDIX.

The foregoing essay was written in the early part of 1849, and presented to the Faculty of Medicine in the University of Glasgow, as a graduation thesis. On my return to Antigua in November of that year, I found that yellow fever was prevailing amongst the European troops to a most fatal extent ; the surgeon and many of the men of the 54th Regiment having fallen victims. On this occasion, it was remarkable that the civilians, unconnected with the garrison, were entirely exempt from the epidemic. Indeed, the poisonous atmosphere appeared to be confined within very small limits, being confined to the Ridge, the chief military station, situated on the south-east part of the island, on a hill of 800 or 900 feet elevation, bounded by the sea on the east and south, and overlooking English Harbour and the Dockyard on the west. The northern boundary is occupied by an extensive tract of uncultivated land, covered with thickets of brushwood. After a time, the troops were removed, and placed under tents at Monk's Hill, an old military post about four miles to the westward of the Ridge, and about the same elevation. It presents an abrupt precipice to the south, which shows it to be composed chiefly of trap breccia and conglomerate, capped by a stratified rock of a beautiful sea-green colour, containing crystals of angite and other minerals* Here the disease gradually abated ; but it was some weeks before the poison imbibed at the Ridge was entirely eliminated from the system, as cases occurred among the men daily for some time after their removal. One officer, who was on a visit to a gentleman in the neighbourhood of St. John's fell under our care. He was bled by my son at the very onset of the attack, and treated with active mercurial purgatives and saline refrigerants and diuretics. On the third day he was convalescent, and taking quinine ; the only symptom of disease remaining being a remarkably slow pulse. Another officer, a young

* This rock was mistaken by Dr. Chisholm many years ago for an ore of copper, and formed the basis of his theory of fish poison — *Edin. Med. and Surg. Journal*, vol. iv, p. 393.

Irishman of gigantic stature and robust frame, was seized whilst on duty at Monk's Hill. Having witnessed the speedy recovery of his comrade, he was most anxious to come to town to be placed under our care. At length the colonel yielded to his wishes, and he was conveyed in a four-wheeled carriage, accompanied by an assistant surgeon.

When I saw him, it was too late for general bleeding; but his intense headachè, ferret-like eyes, and bounding pulse, induced me to have him cupped on the nape of the neck. This produced apparent relief; but the case was attended from the first with an obstinate diarrhœa, which resisted the use of calomel and opium, acetate of lead, and similar remedies. Nevertheless, he survived the critical days on which death usually occurs, and we began to entertain hopes that he might struggle through it, when suddenly he was attacked with delirium, the stools assumed the colour and appearance of black vomit, and he died on the ninth day.

A melancholy case occurred in the family of an engineer officer, who was about to return to England in the next steamer. He fled to St. John's with his wife and daughter a young lady in the full bloom of health and beauty. A day or two after her arrival in the city, this young lady was attacked with the disease, and died on the fifth day.

Five artillerymen were removed to the barrack in St. John's on the 30th November. Next day two of them sickened; and the following day the three others. They were under the care of my friend Dr. Furlonge, who has published an account of them in the *Lancet* for 1850. One died on the fifth, and another on the seventh day; the rest recovered.

I have heard much during the last three years of the successful treatment of yellow fever in Demerara by large doses of quinine and calomel; twenty-four grains of the former and twenty grains of the latter being the usual dose. This practice is so contrary to what I consider the rational treatment of ardent fevers, that I could not in my conscience adopt it in such cases. I might venture to try it in the congestive form of the disease; and perhaps that is the type most prevalent in the swampy colonies of Guiana.

Dr. Blair has had ample opportunities recently of testing the efficacy of this empirical treatment; and the profession may

justly claim from him a report of his extended experience, it is to be hoped, also, that he will publish the result of another experiment he has been making, with the view of protecting individuals from the disease by administering belladonna as a prophylactic.

Yellow fever broke out in Antigua on the 15th of May, 1853,* in the person of a delicate female, a native of Scotland, who had been only eighteen months or two years in the island. This case was reported to me by an express from my son, when I was at St. Kitt's, whither I had gone for change of air, having suffered for some months from a severe attack of acute rheumatism. No other case occurred for several days; but when I arrived, on June 3rd, I learnt that my son had two other cases on his list; one, a young Scotchman, who resided not many yards from the house in which the first case occurred; the other, an army surgeon, living in another part of the city. Both these proved fatal on the fifth day, with black vomit. Cases were now added daily to the list till the end of July, our last case having proved fatal on the 31st of that month.

The following table contains an abstract of all the cases which I attended myself, or with my son, exclusive of those I saw in consultation with other medical men:—

Race	Recovered.	Died.	Total
Europeans...Adults	23	9	32
White Creoles..Adults	3	0	3
„ Children.....	6	2	8
Mixed race...Adults	0	0	0
„ Children	5	1	6
American	1	0	1
Portuguese.....	2	1	3
	<hr/> 40	<hr/> 13	<hr/> 53

The type of this epidemic, in all cases that came under my observation, was certainly that of the *ardent* form. I did not meet with a single case of the *apyretic* or *congestive* type, such as I have witnessed in former epidemics. The patient was most frequently seized in the morning. No decided rigor

* May is usually the healthiest month in the year.

was observed, but he awoke with a feeling of having slept heavily, as if from a narcotic. This was immediately followed by intense headache and pain in the back ; the vessels of the conjunctiva became injected and red ; the force and velocity of the pulse great ; and the heat of the surface pungent. At this period, the tongue presented no unusual appearance. About the third day, the febrile heat subsided ; the cheeks, which had been of a florid red colour, assumed a darker hue ; the lips were red, and the gums spongy and very vascular ; the hands and nails became livid, and, when pressed upon, it was long before the blood returned to the cutaneous vessels. By-and bye, a yellow tinge was perceptible on the conjunctiva, and on each side of the nose, which spread gradually over the neck and chest. Hæmorrhage from the nose and mouth now took place ; flatulency was very distressing ; and the vomiting, which was distressing from the first, now became more urgent, and, in the fatal cases, the matter ejected was mixed with dark flakes, like the lees of port wine, which gradually became blacker and more copious till death closed the scene. In those cases which terminated favourably the discharges from the bowels were copious, and of the darkest sap-green ; and the urine was abundant, and of a good colour. In fatal cases, the motions had not the slightest tinge of green or yellow ; and they exhaled an offensive odour like putrid albumen. In those cases, the urine was frequently suppressed and symptoms of *uræmia* were more or less apparent.

None of the cases in my own practice presented unequivocal marks of *petechiæ* ; but a military officer, under the care of Dr. Furlonge, was spotted like a leopard from head to foot : even the mucous membrane of the mouth exhibited the same symptoms of extravasation.

Death occurred most frequently on the fifth day ; one died on the fourth day, two on the sixth, and one on the seventh day. In those cases in which the urinary secretion was not suspended, death took place by *asthenia* ; the patient retaining his intellect till the last. When *uræmia* existed, convulsions and coma preceded death.

From a variety of causes, no *post mortem* examinations were made.

TREATMENT. When I arrived, I found the lancet had not been used in any case ; but purgatives, and five grain doses of quinine, frequently repeated, with the usual auxiliaries, were chiefly confided in. The quinine so administered appeared to me decidedly injurious, and it was abandoned.

In simple cases, where there was no symptom of local congestion or inflammation, purgatives of calomel, colocynth, and jalap, saline refrigerants, and effervescing draughts, formed the chief medicinal treatment. In more severe cases, five grains of calomel were interposed every two hours. The cold douche was always most agreeable to the patient, and was constantly had recourse to in the first stage. When the headache continued beyond the second day, blisters were applied to the neck or forehead with good effect.

In all cases in which at my first visit there were symptoms of cerebral or hepatic congestion, or when the force of the circulation was so great as to threaten destruction to the capillary system, I had recourse to blood-letting ; and, if we may judge of the propriety of the operation by the rules laid down by Dr. Marshall Hall, we must decide in its favour, although it did not always cure the disease. The loss of blood was well borne in every case. In one patient only was syncope induced, after the loss of twenty-four ounces, and he rapidly recovered. In all the other cases a much larger quantity of blood was drawn, whilst the patient was in the sitting posture, and syncope did not occur. The effect produced was vomiting, copious perspiration, bleaching of the eyes, and relief of the headache. When permanent reduction of the pulse followed these effects, the case invariably did well ; but when the velocity of the pulse continued, the case proved a bad one, and, in my opinion, would have resisted every kind of treatment.

To prove that blood-letting did not do harm, I would mention that it was had recourse to only in the worst cases, and yet not one of these died before the fifth day, whilst two of them lived till the sixth, and one till the seventh day. Of twelve cases in which the lancet was used, six recovered, and six died. In no case was the operation repeated ; and it is a question whether the advocates of this practice would not have deemed it right to repeat the operation at a short inter-

val, when the pulse continued quick. But the prejudice which has been excited by modern writers against large detractions of blood in fevers deterred me.

Having lost in succession four cases in which blood-letting was performed, either by myself or in my presence, with all the immediate effects which follow a successful operation, I considered that I was then bound conscientiously to try the empirical or abortive treatment, with large doses of quinine and calomel, as recommended by Dr Blair of Demerara. The first case that occurred for this trial was that of a young Scotchman, who had recently come to the island. The second dose produced great congestion of the brain, and a stupor from which he could scarcely be roused, and he died on the fourth day. Nevertheless, our next case was treated in the same way, with twenty grains of calomel and twenty-four grains of quinine. Great drowsiness was the immediate result, and we were deterred from continuing the practice. We resumed our former mode of treatment, and the patient recovered.

It is unnecessary to enter upon the treatment that was pursued after hæmorrhages and black vomit occurred ; for I have no confidence then in any medicinal astringent, or in anything but the most diligent exhibition of diffusible stimulants. Patients have sometimes recovered after all hope was abandoned. This was the case with two seamen, who were landed here from a ship bound from St. Thomas to Barbadoes. They were in the last stage of the disease, with hæmorrhages from the nose, mouth, and anus, and black vomit, when admitted into the Infirmary. Sulphate of alum with quinine, tannic acid, and acetate of lead, were successively prescribed ; but I discovered that they took nothing freely except their wine.

NOTE TO PAGE 24, LINE 5.

These remarks with regard to the *abortive* treatment with quinine were written in January 1853 ; since then Dr. Blair has fully responded to the call, and has published in the January and April numbers of the British and Foreign Medico-Chirurgical Review an elaborate report on the last epidemic in Guiana ; in which he has availed himself of the most recent improvements in chemical and physical science in investigating, and describing the phenomena of the disease ; and has arrived at the following hypothetical conclusion.—“The efficient cause of the disease known as yellow fever is an aerial poison, probably organic, which requires a certain tem-

perature for its generation and existence, and affects special localities and persons. This poison attaches itself to the mucous surfaces of the human body. One of the primary effects of such contact, when the quantity is adequate, is to rouse the system into febrile reaction, and to excite through the stomach and intestines an effort to expel the noxious agent. There is reason to believe that this expulsive effort is sometimes successful unassisted, but is materially aided by the action of certain medicinal substances. In the event of the expulsive effort being unsuccessful, the effect of this poison is to act destructively on the epithelial structures of the body by inducing a specific irritation in the basement membrane, by which, and by allied consecutive lesions, the arterial and capillary tissues are impaired, the viscera become congested, the blood thereby contaminated by suppressed secretions, and fatal hæmorrhages ensue."

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